

INCREDIBLE NON-FICTION WORKS OF DFS

ANNUAL REPORT

2017

#1

SUPER SCIENCE SAFER STREETS



D.C. DEPARTMENT
OF FORENSIC
SCIENCES

WE ARE
WASHINGTON
DC GOVERNMENT OF THE
DISTRICT OF COLUMBIA
MURIEL BOWSER, MAYOR

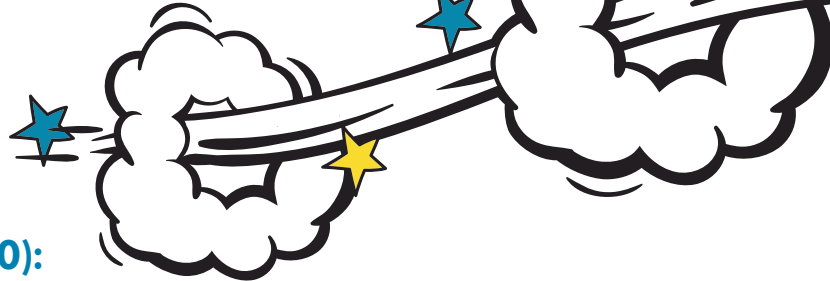


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MEET THE DFS TEAM



NYA VERIDAS (DFS HERO):

Nya is a natural born leader, with a knack for staying organized and getting people to work together in harmony. She may be known by most as a DFS administrative assistant, but she can also be found helping her fellow heroes in the fight to keep DC safer. She uses her powers of flight, speed, and strength to lead her teammates. In her spare time, she likes to go rock climbing, play the drums, and learn how to make video games.



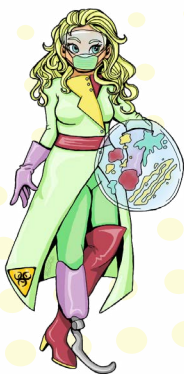
CECIL RUYA (FSL HERO):

Cecil was born blind in one eye, but his talent for tinkering led to the creation of his bionic eye. Its abilities give him the perfect set of skills to work in the Forensic Science Laboratories. Its microscope lens helps to see the tiniest striations on a bullet, and its built-in camera lets him take comparison photographs of fingerprints. During his free time, he loves to write songs, build computers, and do parkour.



JUSTIN GYEONG (CSS HERO):

Justin works for the Crime Scene Services unit, where he can use his telekinetic powers to carefully lift evidence without damaging or contaminating it. Dedicated and detail-oriented, he's always excited to see what new things he'll learn from the next crime scene he goes to. When he's not working, he spends his time volunteering at local animal shelters or building models of famous monuments and buildings in DC.



KATI SLOAN (PHL HERO):

Kati has dedicated herself to working at the Public Health Lab to make life safer for the rest of DC. She has the power to control the weather around her-at the lab, she uses these abilities to support the growth of microbes, viruses, and other biologicals to see how they grow and spread. She can also use her powers to decontaminate surfaces and supplies, and learn how to keep people from getting sick. After work, Kati can be found taking kickboxing classes or tending to her garden.



LETTER FROM THE MAYOR

Dear Resident:

The Department of Forensic Sciences (DFS) is a vital partner in our multiagency approach to making a safer, stronger DC. DFS workers are our crime-fighters behind the scenes. They don't make the arrests; they enable them, with the undeniable, scientific facts that identify suspects. They don't argue the case; they provide the unquestionable truths through testing and analysis that make the prosecution's case. Their work can convict violent offenders, or exonerate those who have been wrongly accused. Our city experienced a double-digit drop in overall crime in 2017. That success can be attributed to the collaborative efforts of DFS, its public safety agency counterparts, and Washingtonians like you who are stepping up to help make our neighborhoods safer.

In many ways, DFS scientists are superheroes. Like all of our city's public safety agencies, they are on call 24/7. They recover evidence from crime scenes, test firearms, interpret latent fingerprints, analyze DNA samples, and evaluate digital information. Their work assists in identifying crime patterns, zeroing-in on repeat violent offenders, and removing illegal guns from our streets.

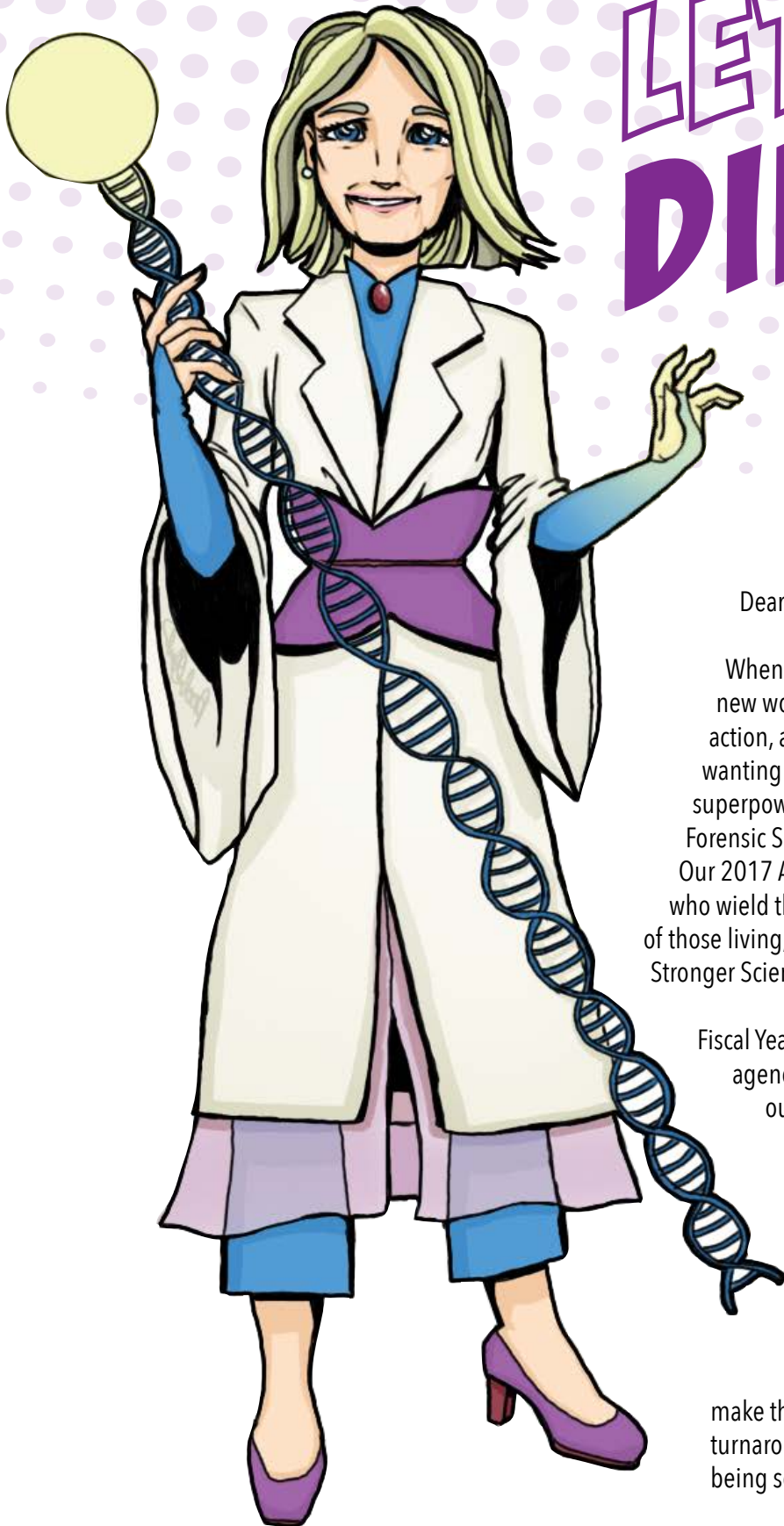
DFS also shoulders the responsibility of protecting residents and DC visitors from public health epidemics by identifying food-borne illnesses like e-coli, developing flu vaccines, and monitoring mosquitoes for viruses.

During 2017, DFS implemented various improvements across the agency to become more productive and efficient. Measures of success include: two clean audits by two different accrediting bodies, a zero backlog of sexual assault kits, completing 95 percent of homicide and priority cases in the latent fingerprint department within 60 days, and utilizing new technologies and procedures to keep its laboratories on the national forefront of advances in the field.

I am proud of the hard work my Administration is doing to protect DC residents and visitors from public health problems and criminal activity, and to foster a higher quality of life for everyone.

Please enjoy this summary of DFS's accomplishments in 2017.

Muriel Bowser
Mayor



LETTER FROM THE DIRECTOR

Dear Resident,


When I was a child, comic books were my escape into a new world - an adventurous dimension full of creativity, action, and extraordinary powers. These books left me wanting to return on a daily basis and wishing I had superpowers of my own. As Director of the DC Department of Forensic Sciences (DFS) I get to witness super science every day. Our 2017 Annual Report salutes the amazing DFS superheroes who wield their superpowers to protect the lives and well-being of those living, working, and visiting in DC by demonstrating that Stronger Science means Safer Streets.

Fiscal Year 2017 (FY17) has been a remarkable year for the agency and has included successful efforts to engage our customers, improve our timeliness, maintain our quality, build towards the future, and help create a safer, stronger DC. My staff have not only stepped up to help rebuild the reputation of this agency and supporting laboratories, but they have also consistently been sought out to train, provide guidance, and even coach other laboratories on some of the tools that they have been using. Having the support of city leadership to make the necessary changes has allowed us to increase our turnaround times, which equates to swifter justice being served.

Mayor Bowser's FY17 Budget reflected our deep commitment to DC values by making investments that provided all DC residents with the opportunity to succeed. Our labs and offices are filled with capable and dedicated scientists and staff who strive daily to deliver high-quality and reliable forensic science services to critical stakeholders. Three years ago, DFS was without an IT infrastructure to track critical movement of evidentiary items. Today, the Forensic Technology Unit (FTU) ensures that several Laboratory Information Management Systems (LIMS) are supported and streamlined. In FY17, the training program delivered over 2,220 hours of instruction for all three divisions, covering numerous discipline-specific topics for DNA, firearms, and fingerprint examiners, as well as public health lab scientists.

Other notable milestones that took place in to increase the District's investigation and of digital information.

FY17 include the establishment of the Digital Evidence Unit (DEU) testing capabilities for a wide variety of cybercrimes, fraud, and collection



Our 2017 Annual Report salutes the amazing DFS superheroes who wield their superpowers to protect the lives and well-being of our residents and visitors.

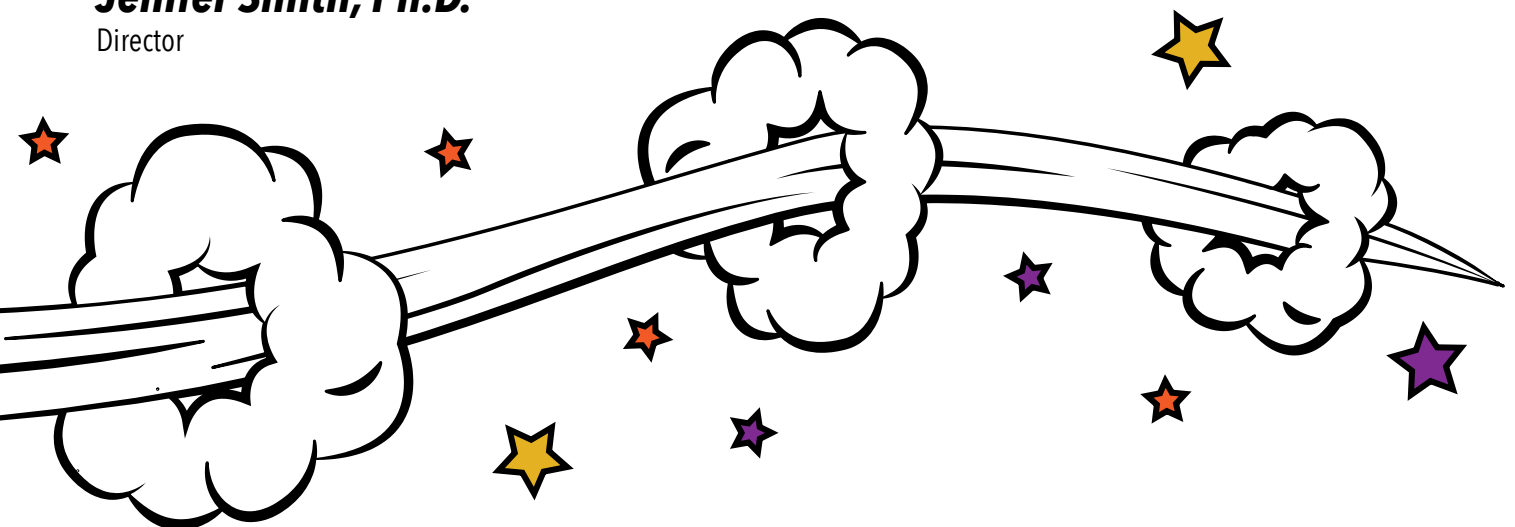
The Quality Team successfully led the Department through several external audits of the Forensic Science Laboratory Division (FSL) and the Public Health Laboratory Division (PHL). Additionally, the Forensic Biology Unit (FBU) successfully passed external National DNA Standard audits and, for the second year in a row, passed all assessments. Our Forensic Chemistry Unit (FCU) participated in several studies, including examination of syringes provided by DC's Office of the Chief Medical Examiner (OCME) in suspected synthetic opioid deaths. During these studies, FCU chemists identified a new compound, methoxyacetyl fentanyl, a deadly and dangerous fentanyl analog.

On behalf of DFS, I would like to thank Mayor Bowser and her staff for their continuous and generous support as we strive to realize her vision of a safer, stronger DC. We also acknowledge the support of Kevin Donahue, Deputy Mayor for Public Safety and Justice, and our federal and local partners as we strive to produce stronger science to make DC the safest city in the country.

Sincerely,

Jenifer Smith, Ph.D.

Director





OPERATIONS

Operations ensures every division of DFS – the Forensic Science Laboratory, the Crime Scene Sciences Division, the Public Health Laboratory, and the Training and Quality Division – has the staff, resources, and technological support they need to best serve the people of the District of Columbia. With daily responsibility for keeping DFS running smoothly and efficiently, Operations manages purchasing and budgeting, health and safety, human resources, information technology, and performance management oversight and initiatives across DFS.

In FY17, Operations continued efficiently to discharge its normal duties, as reflected in its Key Performance Indicators and Workload Measures, while streamlining its delivery of Human Resources services through its one-stop shop SharePoint portal, working to incorporate new technology to obtain greater productivity from every division of DFS, and ensuring the health and safety of DFS' every-day heroes through collaboration with DC Health and the U.S. Department of Homeland Security. In July 2017, Operations worked with the Office of the Chief Technology Officer to perform a DFS-wide asset and equipment inventory project, better enabling DFS to manage its maintenance and replacement schedules, and ensuring DFS' working scientists' uninterrupted access to the best and most reliable tools and resources. These on-going projects and infrastructural improvements will continue to improve DFS' performance in FY18 and beyond.

KEY PERFORMANCE INDICATORS

DFS works to make life better for the people of DC in every aspect of its operation. In FY17, Operations was able to more than double its projected utilization of Certified Business Enterprises (CBE) and Small Business Enterprises (SBE), routing a significant portion of its necessary spending into small and local businesses right here in the District. This effort resulted in a FY17 total SBE/CBE spend of \$1,444,574.85, fully 209.76 percent of the agency's approved goal of \$688,674.97. Utilization of DC SBEs and CBEs remains an



important commitment for all of DFS, and a valuable resource for Operations in the discharge of its duties.

WORKLOAD MEASURES

DFS quantifies and tracks each division's workflow through workload metrics. In FY17, Operations' Workload Measures actively tracked the division's procurement, employee on-boarding, statistical performance management analysis, IT service calls, and health and safety incident responses:

- Operations (Number of requisitions submitted into the Procurement Automated Support System, also known as "PASS")
✓ FY17: **364**
- Human Resources (Number of employees on-boarded)
✓ FY17: **46**
- Performance Management (Number of unique statistical reports generated)
✓ FY17: **13**
- Forensic Information Technology (Number of IT service requests received)
✓ FY17: **3,921**
- Health/Safety (Number of safety incidents reported)
✓ FY17: **46**



HUMAN RESOURCES

Operations expends special effort to attract the best and most talented women and men to maintain its staffing needs. In FY17, Operations participated in job fairs catering to local youth, local universities, and local veterans. Drawing from such a diverse and talented community as the District, in FY17, DFS continued to grow and offer greater responsibility and opportunity to its existing staff:

- New Hires: **46**
- Career Ladder Promotions: **18**
- Promotions: **19**

With the tireless efforts of Operations' Human Resources professionals, DFS remains an exceptionally strong, capable, and diverse workforce.





CRIME SCENE SCIENCES DIVISION

The Crime Scene Sciences Division (CSSD) is responsible for the collection and preservation of evidence from crime scenes in the District of Columbia, as well as the storage of evidence while it is contained within the department. DFS provides these services 24 hours a day, 7 days a week. CSSD consists of two units, the Central Evidence Unit (CEU) and the Crime Scene Sciences Unit (CSSU). CSSD is also responsible for organization of the DFS force multiplier team that supports the Office of the Chief Medical Examiner during mass fatality incidences. This team consists of approximately 60 DFS employees who have received special training to respond to these events.

This year, we added a new superhero to our team - CEU Manager William Boehm. Under his leadership and with the support of his amazing staff, this unit carefully manages high volumes of evidence on a daily basis. CSSD is also the gatekeeper of materials that could lead to the identification of suspects, victims, or even those who have witnessed crimes. Here are a few of the division's most notable achievements in FY 17;

CEU's WORKLOAD MEASURES

- CEU received **69,625** pieces of evidence in FY17 from various crime scenes throughout the District to assist with

the enforcement and investigative process. The unit works diligently with the Metropolitan Police Department's Evidence Control Branch (ECB) to manage evidence recovered so that it can be evaluated, and in some cases, eventually returned to owners.

- CEU continues to track evidence accurately through the Laboratory Information Management System (LIMS), which was activated at the beginning of October 2015. Prior to LIMS, CEU did not have a reliable recording protocol in place. LIMS has allowed the unit to speed up turnaround time from the moment evidence is collected from a crime scene to when it undergoes testing.
- Below are just some of the types and quantities of evidence that were received by CEU:
 - ▶ Cartridge casings: **16,041**
 - ▶ Latent lifts: **3,463**
 - ▶ Firearms: **2,200**
 - ▶ Swabs: **1,689**
 - ▶ Currency-money: **404**
 - ▶ Drugs: **398**
 - ▶ Weapons (other): **71**

ACCOMPLISHMENTS

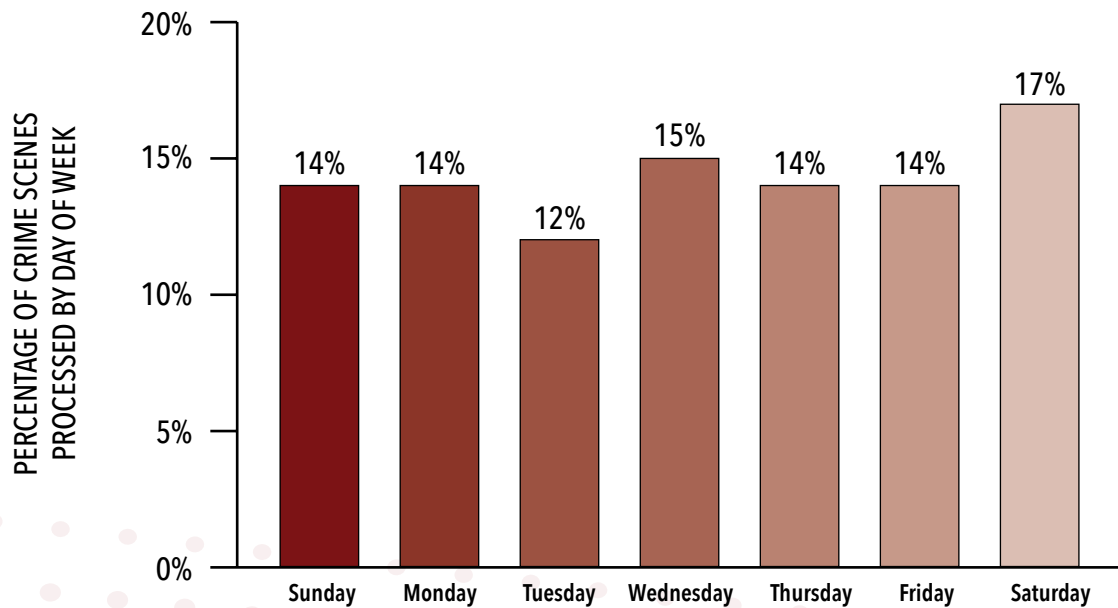
- In FY 17, CEU began an initiative to reduce the **backlog of firearms and firearms-related evidence** stored at DFS
- In FY 17, CEU began an initiative to reduce the **backlog of swab samples** stored at DFS.

CRIME SCENE SCIENCE UNIT (CSSU)

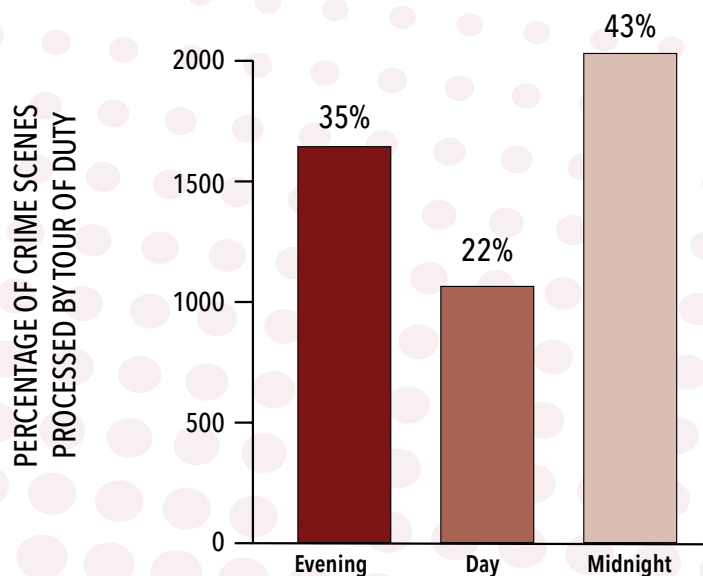
CSSU's WORKLOAD MEASURES

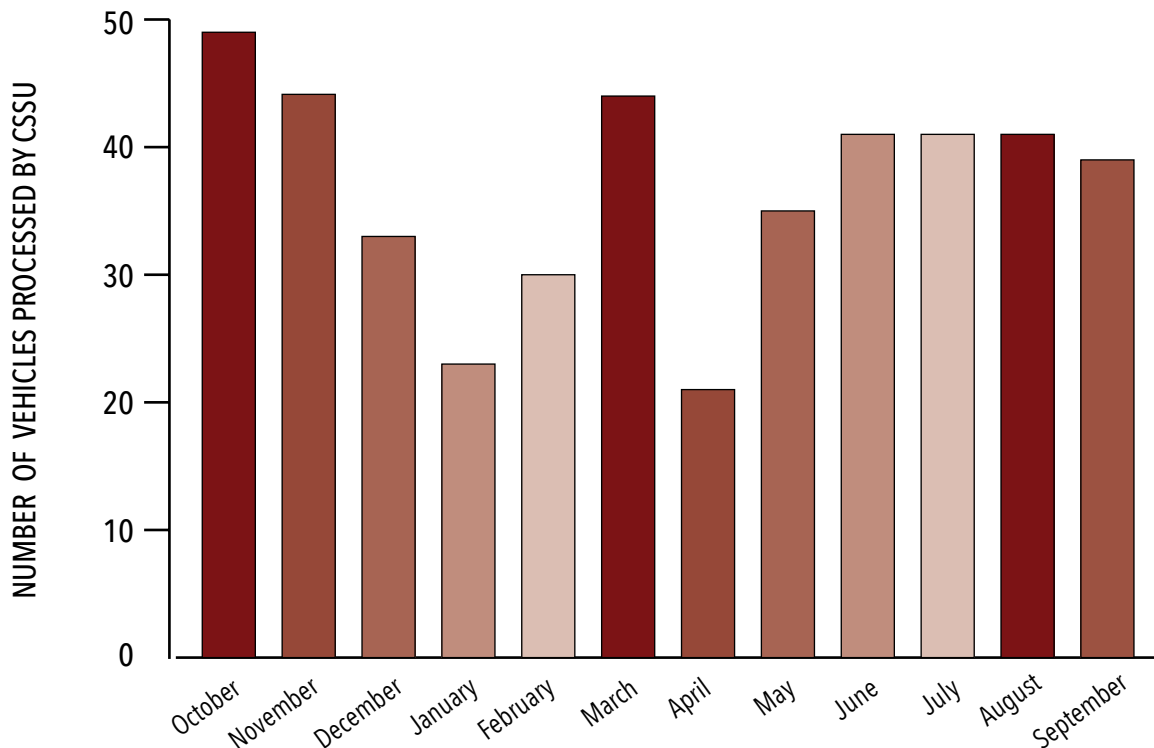
CSSU was called out to **4,915** crime scenes in FY17. The graphs below indicate the percentage of crime scenes processed by day of the week and by tour of duty:

CRIME SCENES PROCESSED BY DAY OF THE WEEK IN FY 17



CRIME SCENES PROCESSED BY TOUR OF DUTY IN FY 17





Vehicles processed FY2017 **TOTAL 444**

3D LASER-SCANNING

The 3D laser-scanner is one of the newest and most advanced tools used in criminal investigations today, and in FY 17, every member of our CSSU was trained to use it. This scanning allows scientists to quickly gather data on crime scenes and accurately reconstruct debatable events - like car accidents. It also enables scientists to create more vivid courtroom presentations so jurors can better understand testimony. Finally, images taken by 3D laser scanners are preserved digitally, so investigators can refer to the stored data as often as needed. Using digitally-saved data - like the distance scanned from a discarded cigarette lighter to a bullet casing - gives exact measurements on crime scenes, as opposed to other methods that aren't as precise due to human error.

ACCOMPLISHMENTS

- In FY 17, our CSSU scanned all homicides, police-involved shootings, Assaults with Intent to Kill (AWIK) cases, and fatal car accidents.
- 13 forensic scientists passed the International Association for Identification (IAI) certification course. IAI is the world's oldest and largest forensic organization, with more than **6,700** members worldwide. DFS sponsored this certification.
- CSSU processed a total of **444** vehicles in FY 17
- Participated in the DC Mass Fatality Management Table Top Exercise
- Participated in Mass Fatality Full Scale Exercise for the National Capital Region (DC, MD and VA)





FORENSIC SCIENCE LABORATORY

The DFS Forensic Science Laboratory Division (FSL) provides a full spectrum of forensic science

services to DC and federal stakeholder agencies upon request.

Composed of the Forensic Intelligence Unit (FIU), Latent Fingerprint Unit (LFU), Firearms Examination Unit (FEU), Forensic Biology Unit (FBU), and the Digital Evidence Unit (DEU), FSL is fully equipped to apply the most advanced and extensively validated scientific techniques to the analysis and examination of evidence in whatever form it might take. A single smartphone submitted to FSL for processing may yield fingerprints for LFU analysis, blood to be analyzed by the FBU, and GPS and other data to be extracted by the DEU. As the direct result of the hard work of FSL's multi-disciplinary team, investigative leads are developed from national database hits, multiple cases can be linked through the use of a single

weapon or by the existence of a single DNA profile, and existing suspects may be confirmed or excluded.

The modern criminal justice system relies on the forensic sciences to extract the truth from a continuous stream of physical evidence of every kind, and in FY17, FSL continued to distinguish itself and the quality of its analyses and processing of every variety of evidence in new and exciting ways. With multiple units providing forensics outreach training, participating in the validation of emerging laboratory techniques to expand the volume of high-quality information extractable from existing physical evidence, and taking part in special purpose government partnerships to address the most fundamentally important problems facing the modern criminal justice system, FSL used FY17 to further cement its place as a leader in the development and implementation of the most advanced and reliable techniques. These investments in technical development, infrastructural streamlining, and collaborative inter-governmental projects paid dividends in FY17 will continue to help make the people of DC safer for years to come.

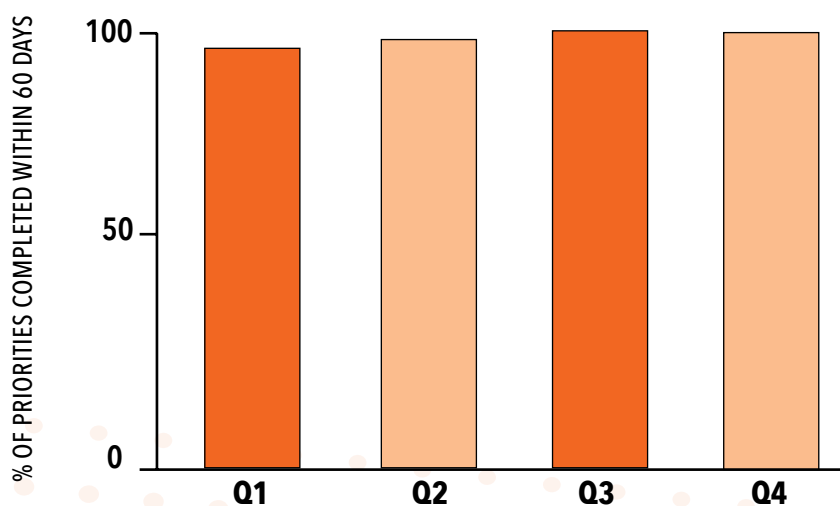
LATENT FINGERPRINT UNIT (LFU)

Among the oldest and most familiar of the forensic sciences, latent fingerprint analysis holds a special place in the public consciousness with fingerprint existing in the American lexicon as synonymous with ideas of unique identity and attribution in any context. At DFS in FY17, LFU received the second largest volume of requests for testing, and still managed to beat its metric goals for turnaround times and analyst trainings by a wide margin. Having laid the ground work for implementation of the Mideo case management system in FY17, LFU has positioned itself well for the system's live casework roll out, and all of the associated operational benefits in FY18.

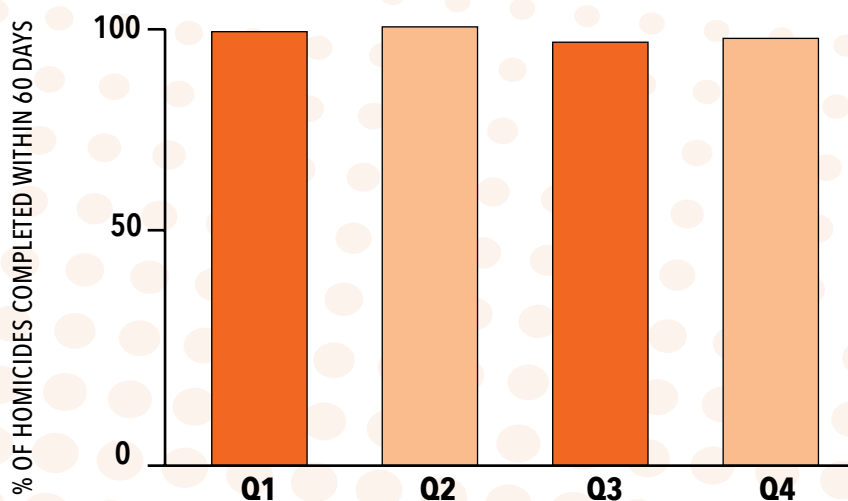
KEY PERFORMANCE INDICATORS

Going into FY17, the Latent Fingerprint Unit had set a goal that 50 percent of evidence testing related to priority and homicide cases would be completed within 60 days. LFU far exceeded this projection, with a full 98 percent of priority cases, and 96 percent of homicide cases completed within 60 days.

% PRIORITY COMPLETED WITHIN 60 DAYS

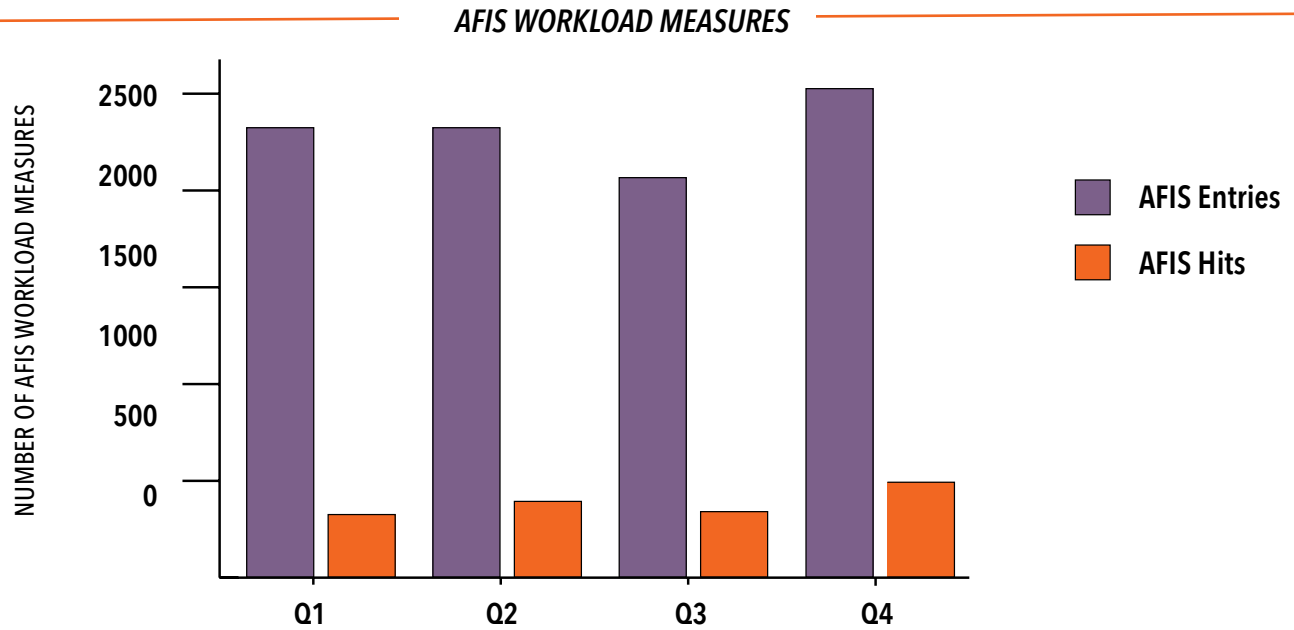


% HOMICIDE COMPLETED WITHIN 60 DAYS



WORKLOAD MEASURES

An important Workload Measure for LFU is its utilization of the Automated Fingerprint Identification System (AFIS), a biometric identification system utilizing digital imaging technology to obtain, store, and analyze fingerprint data. In FY17, LFU entered a total of 9,248 entries into AFIS and made a total of 1,558 hits tied to other criminal investigations. Below, AFIS entries and hits are broken down by quarter:



ACCOMPLISHMENTS

- **Began implementation of the Mideo system to increase quality and transparency of fingerprint examinations and resulting work products.** This system will be used in FY18 and beyond as a complement to the Laboratory Information Management System (LIMS) for image management, case notes, visual document analyses, and comparisons, providing the best and most up-to-date case management tools to the unit.



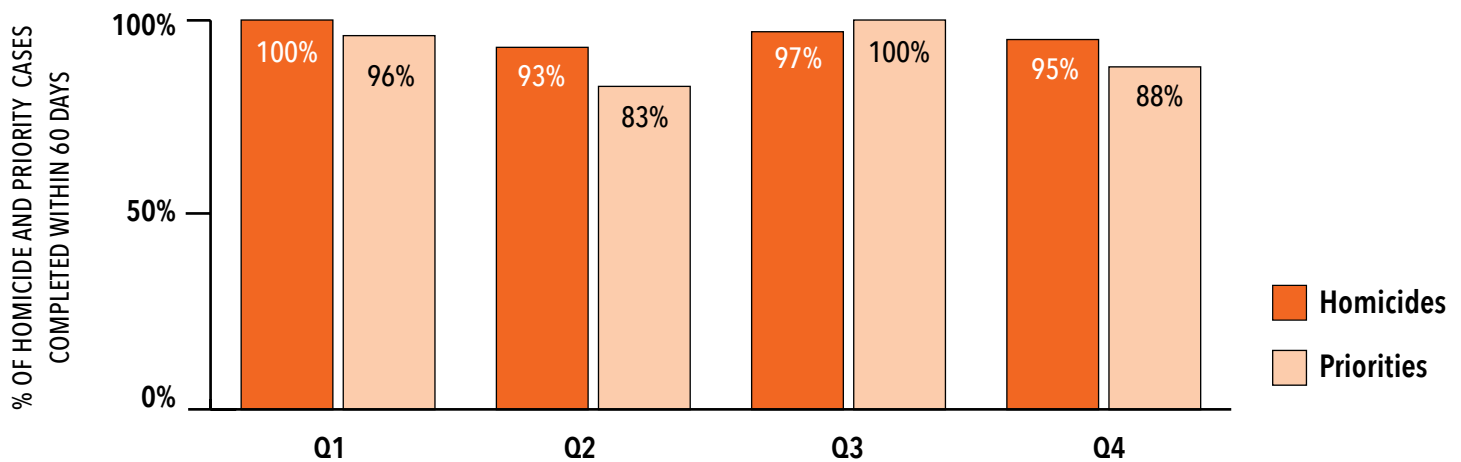
FIREARMS EXAMINATION UNIT (FEU)

The FEU is an indispensable tool in the District's prevention of and response to gun violence. Capable of matching or excluding ammunition and casings to a given firearm, interpreting tool marks created by harder substances coming in contact with softer, tracking individual weapons used in multiple crimes, and recognizing trends in the kinds of weapons and ammunition being used to facilitate criminal activity in DC, the DFS superheroes in the FEU work every day to make the District safer. In FY17, FEU members were recognized both internally and by outside agencies for their role in high-profile gun crime investigations and prosecutions, linked homicides and other violent crimes to common weapons, and were featured in TIME

Magazine, the Washington City Paper, and Great Day Washington "Live." Working tirelessly to share its expertise with other governmental entities through training series, and implementing new case management systems, FEU has made a continuing investment in the future of firearms examination in the District and the discipline nationwide.

KEY PERFORMANCE INDICATORS

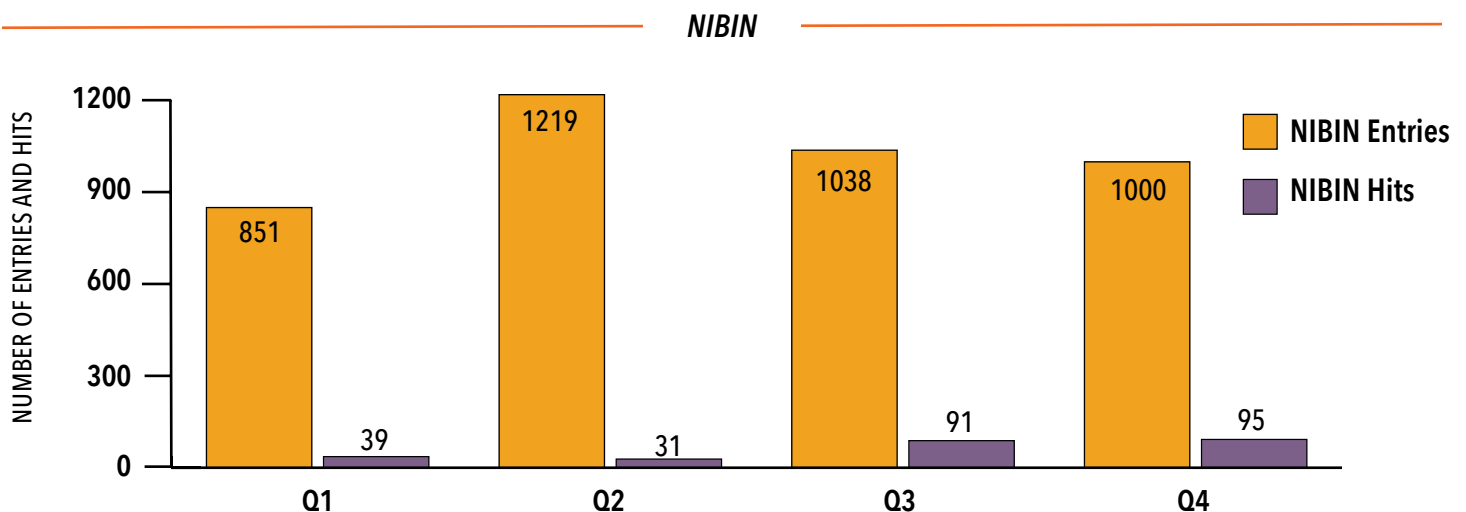
Coming into FY17, FEU aimed to process 50 percent of received samples related to priority and homicide cases within 60 days of receipt. FEU beat this projection by a wide margin, completing 91 percent of priority and 96 percent of homicide cases within 60 days.

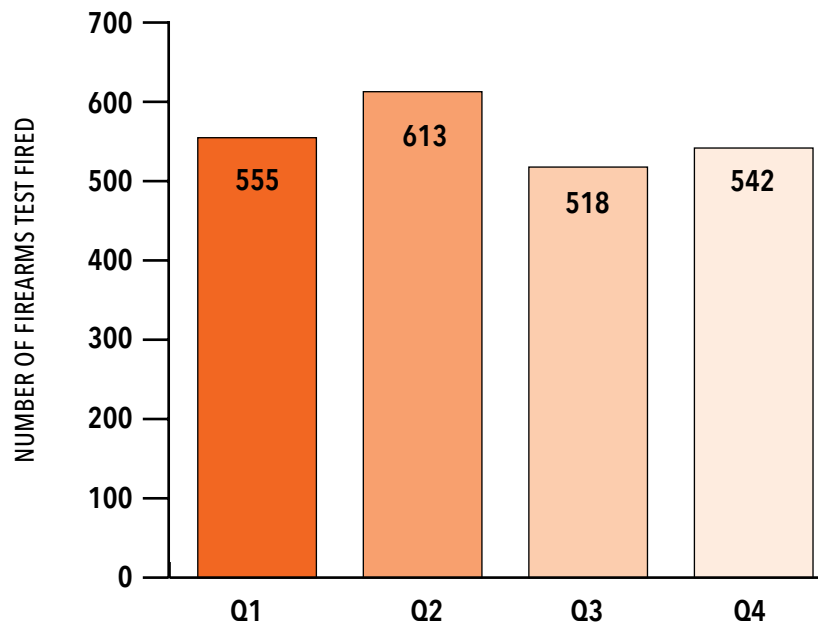


WORKLOAD MEASURES

FEU utilizes the National Integrated Ballistic Information Network (NIBIN) to upload and check digital images of fired bullets and cartridge casings against similar images uploaded by other forensics laboratories nationwide. NIBIN hits regularly result in investigative leads and evidence admissible at

trial, greatly facilitating gun crime prevention and response across the country. In FY17, FEU made 4,108 entries in NIBIN, triggering 256 hits tied to other criminal investigations. Below is the quarterly breakdown of entries and hits:





ACCOMPLISHMENTS

- **In FY17, FEU made several high profile NIBIN hits**, including hits linking an unsolved homicide to additional unsolved homicides and other violent crimes, and linking a mass shooting at a neighborhood gathering to a single unlicensed firearm previously used in an assault with a deadly weapon.
- **FEU began implementation of the Mideo system.** Like the LFU, FEU began implementation of the Mideo system,

which will aid FEU in managing workflows and increase efficiency.

- **FEU was sub-awarded a Federal Crime Gun Intelligence Center (CGIC) grant for approximately \$500,000 to help streamline processes for the NIBIN system.** This streamlined process will support multidisciplinary, inter-governmental teams to support multidisciplinary and intergovernmental teams with identifying perpetrators and connecting the criminal activity of guns involved in crimes for immediate disruption, investigation, and prosecution.

FORENSIC BIOLOGY UNIT (FBU)

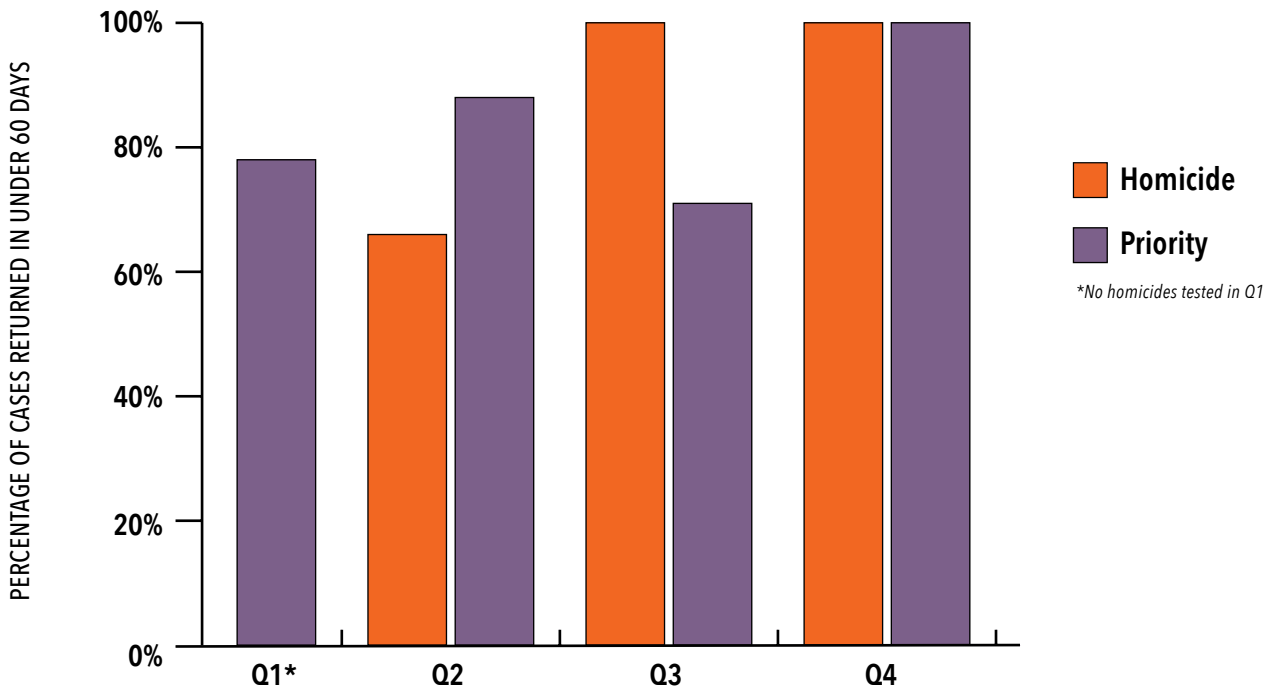
Managing the largest volume of requests for testing among the FSL units, and the largest single-year FBU request volume in DFS history, the FBU was unprecedentedly productive in FY17. Serving the people of DC by performing a variety of scientific analyses on various biological materials to develop investigatory leads, and to confirm or exclude suspects in every kind of criminal case, FBU also made significant contributions to the general advancement of the field of forensic biology. In FY17, FBU implemented GlobalFiler, a new testing platform that permits examination of additional locations on the DNA molecule. At the same time, FBU enhanced their processing of mixed DNA profiles to identify up to five separate DNA donors in a single piece of evidence. Mayor Bowser recognized the women and men of FBU for the quality of their expert

testimony given in support of STRmix technology introduced in FY16. Additionally, FBU participated in a three-laboratory review of the emerging Next Generation Sequencing (NGS) technique, which will be used by the FBI in determining whether the technique will be accepted for use with the Combined DNA Index System (CODIS), used to index and match forensic DNA nationwide.

KEY PERFORMANCE INDICATORS

Going into FY17, FBU aimed to test at least 50 percent of samples related to priority and homicide cases within 60 days. FBU beat this aim by a wide margin, completing 89 percent of priority and 88 percent of homicide cases within 60 days.

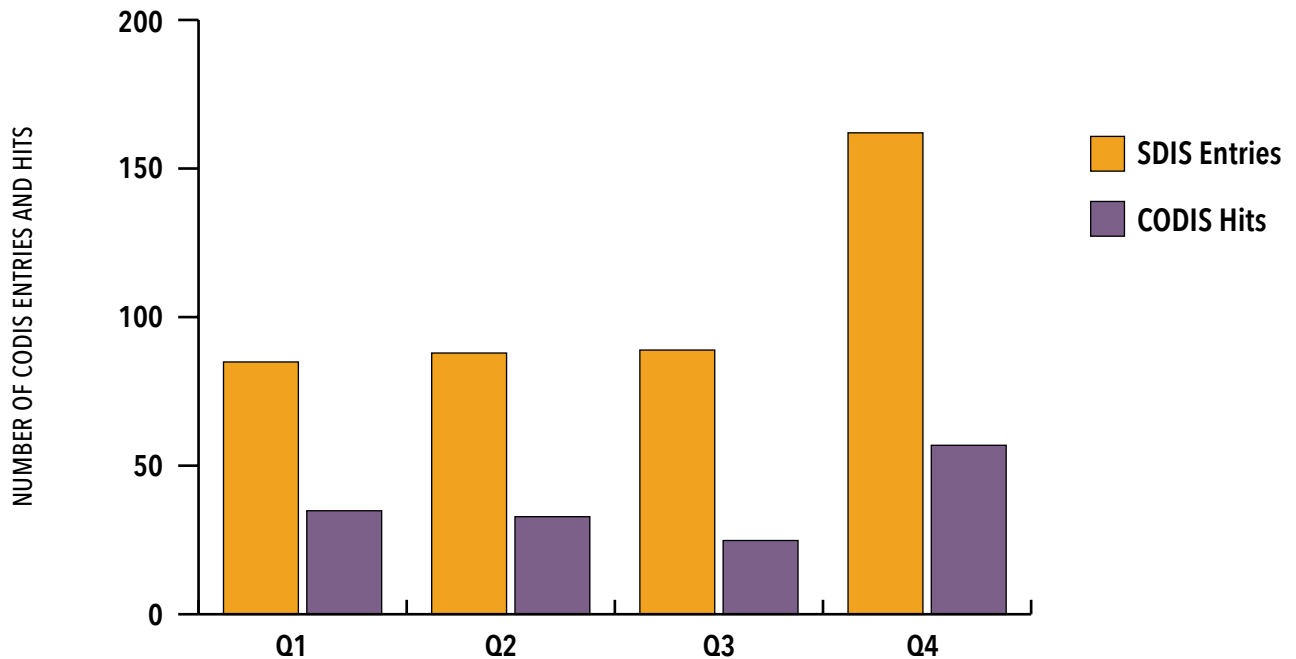
PERCENTAGE OF CASES RETURNED IN UNDER 60 DAYS



WORKLOAD MEASURES

The Forensic Biology Unit entered a total of 424 profiles into CODIS, yielding 150 hits.

CODIS ENTRIES AND HITS



ACCOMPLISHMENTS

DNA forensic testing helped to support the investigation of a March 2017 female homicide victim. The victim was found deceased in her apartment. FBU conducted DNA testing on over 30 items of evidence including a sexual assault kit, swabs from her apartment, and clothing recovered from a suspect. DNA testing conclusively linked the suspect to the victim, helping to connect him directly to the murder. He has been charged with first degree murder and is currently awaiting trial.

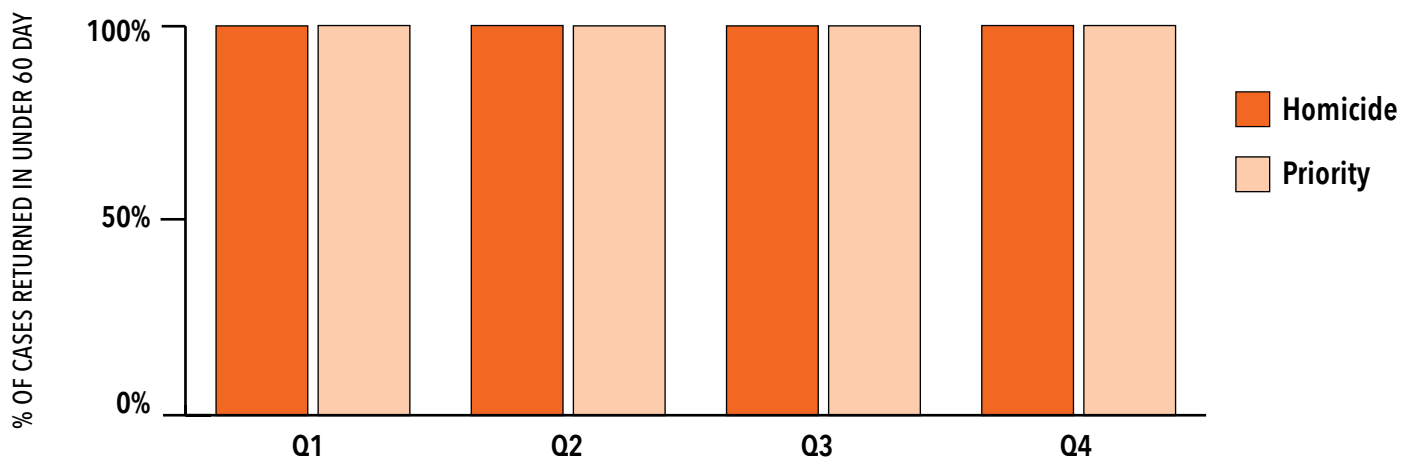
DIGITAL EVIDENCE UNIT (DEU)

As smartphones, personal computers, and smart consumer products continue to grow in importance in the lives of the people of DC, and as these devices continue to collect more and more information about the world around them, the work of FSL's DEU will only grow in prominence. The DEU is responsible for extracting and analyzing digital information in whatever form it might be retained. The women and men of DEU add new technical capacities regularly throughout the year, keeping pace with advancements in security technology to ensure no evidence is put outside the reach of investigators or the courts, no matter how sophisticated its technological protections. In FY17, DEU incorporated "chip off" and "re-balling" techniques to physically manipulate the silicon chips integrated into digital media devices and permit access to data that would be impregnable through software-based examination, alone. So long as criminals continue to take advantage of new ways to hide their data, the superhero scientists at FSL's DEU will continue to implement new ways to break down those defenses and expose the truth.

KEY PERFORMANCE INDICATORS

At the start of FY17, DEU aimed to test at least 50 percent of submitted evidence related to priority and homicide cases within 60 days. DEU far exceeded this goal, completing 100 percent of priority and homicide evidence samples within 60 days.

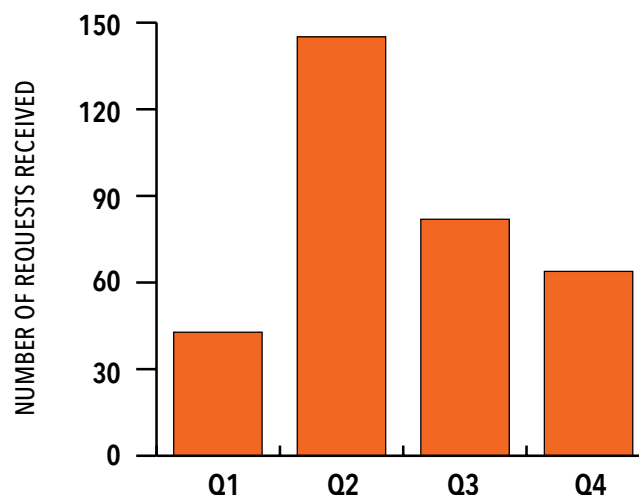
PERCENTAGE OF CASES RETURNED IN UNDER 60 DAYS



WORKLOAD MEASURES

In FY17, DEU received a total of 334 requests.

REQUESTS RECEIVED



ACCOMPLISHMENTS

- **Completed and implemented the DEU Business Plan to provide the preservation and analysis of digital evidence. Implementation of the plan has resulted in the following:**
 - ▶ Established engagement with new agencies
 - ▶ Assisted with several high-profile cases (as highlighted below)
- **ATM Skimming Cases:** MPD identified two persons of interest in a possible credit card skimming ring at a 7-11 store. DEU obtained the video recorded inside the store, assisted in identifying the time/date of the video recording, and analyzed two chips located inside the skimmer device that may contain credit card data that can be used to advance the investigation.
- **Comet Ping Pong Investigation:** In a case making national news, a shooter traveled from North Carolina to the District on December 4, 2016, based on a viral internet rumor known as "Pizzagate," an unfounded conspiracy theory that linked a former presidential candidate to an alleged child-sex-trafficking ring. The false stories said

the ring operated in the basement of Comet Ping Pong. Upon receipt of the shooter's smartphone, DEU extracted several text messages, videos, and other information. The data obtained from the phone included several text messages and a video communicating his intention to carry out the attack.

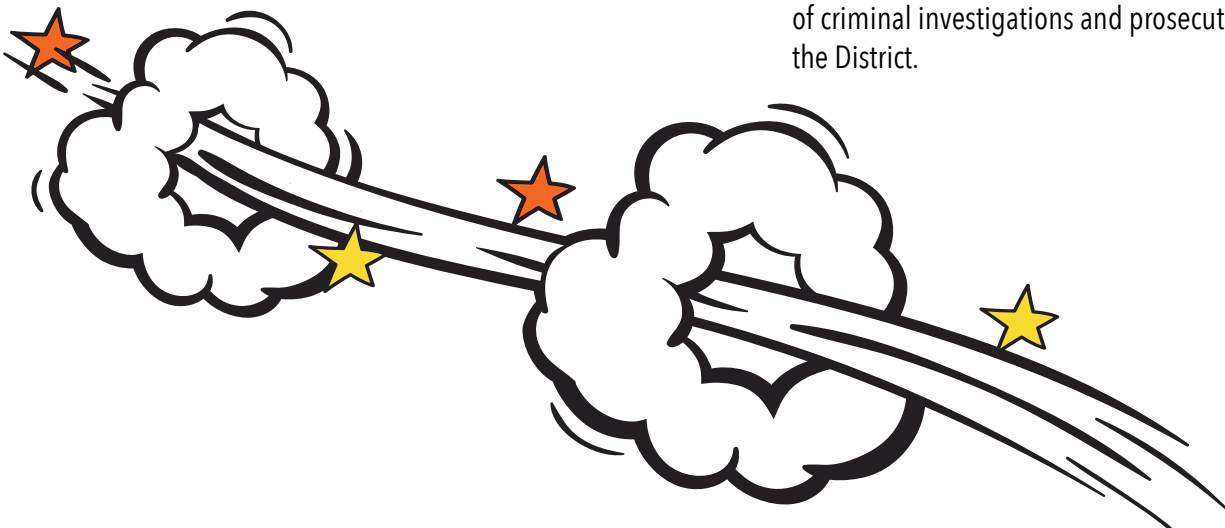
- **Five Robberies and Cell Phone Investigation:** On June 28, 2017, an unknown man walked into a Dunkin Donuts and proceeded to rob the store at gunpoint, leaving behind his phone. Subsequently, four other businesses were robbed by an individual wearing what appeared to be similar clothing, and using what appeared to be the same silver-colored handgun. On July 11, 2017, DEU extracted the phone number, "selfies," user account information, and other valuable data from the phone which was provided to MPD detectives. As a direct result, a suspect was arrested and charged with all five robberies, resulting in the end of a streak that ran from June 28 through July 10.

FORENSIC INTELLIGENCE UNIT (FIU)

Newly formed in FY17, the Forensic Intelligence Unit (FIU) helps to guarantee that evidence submitted to FSL is properly prioritized, subjected to all appropriate testing, and ultimately timely reported out in a meaningful, easily understood format. Even after reporting, though, the work of the FIU is not done. The unit follows the FSL's reports through their return to DFS stakeholder agencies, tracking the effects and impacts of FSL's testing. FIU then performs statistical analyses of these effects and impacts to ensure that FSL's resources are being deployed in the best way to maximize their return for the people of DC.

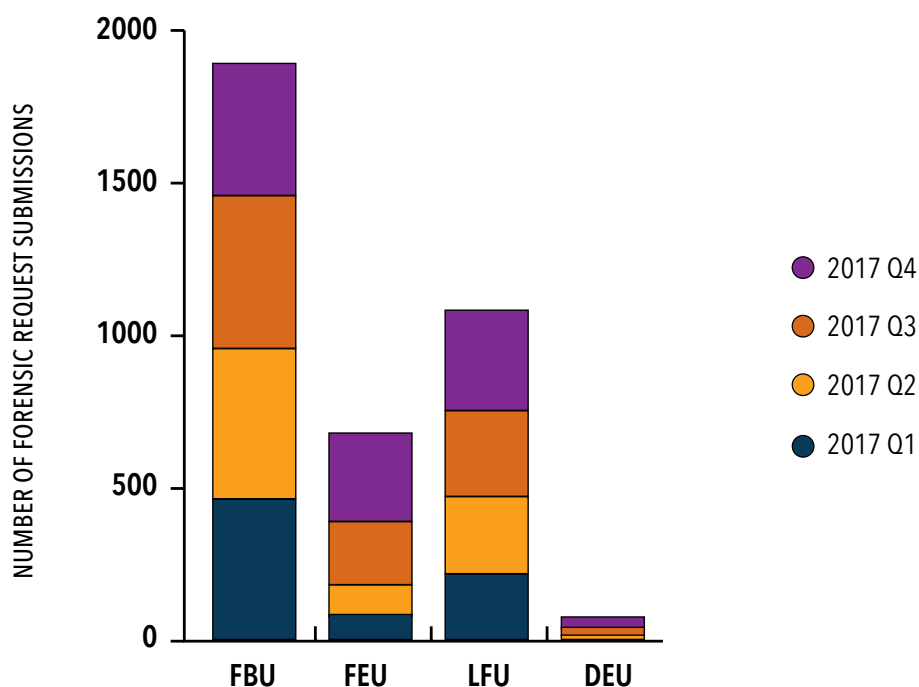
WORKLOAD MEASURES

It is FIU's responsibility directly to receive the more than 3,700 forensic testing requests made by DFS's stakeholders and partner agencies. In FY17, FIU received requests for testing from the Metropolitan Police Department, United States Attorney's Office, the Office of the Attorney General for the District of Columbia, the Office of the Inspector General for the District of Columbia, the United States Park Police, the Naval Criminal Investigative Service, the Federal Protective Service, and the Metro Transit Police Department. FIU received over 3,600 requests from the MPD and USAO, alone, in support of criminal investigations and prosecutions of crimes within the District.



Below, FSL's FY17 requests for testing are broken out by unit, per quarter, illustrating the relative volume of requests passed on to each unit:

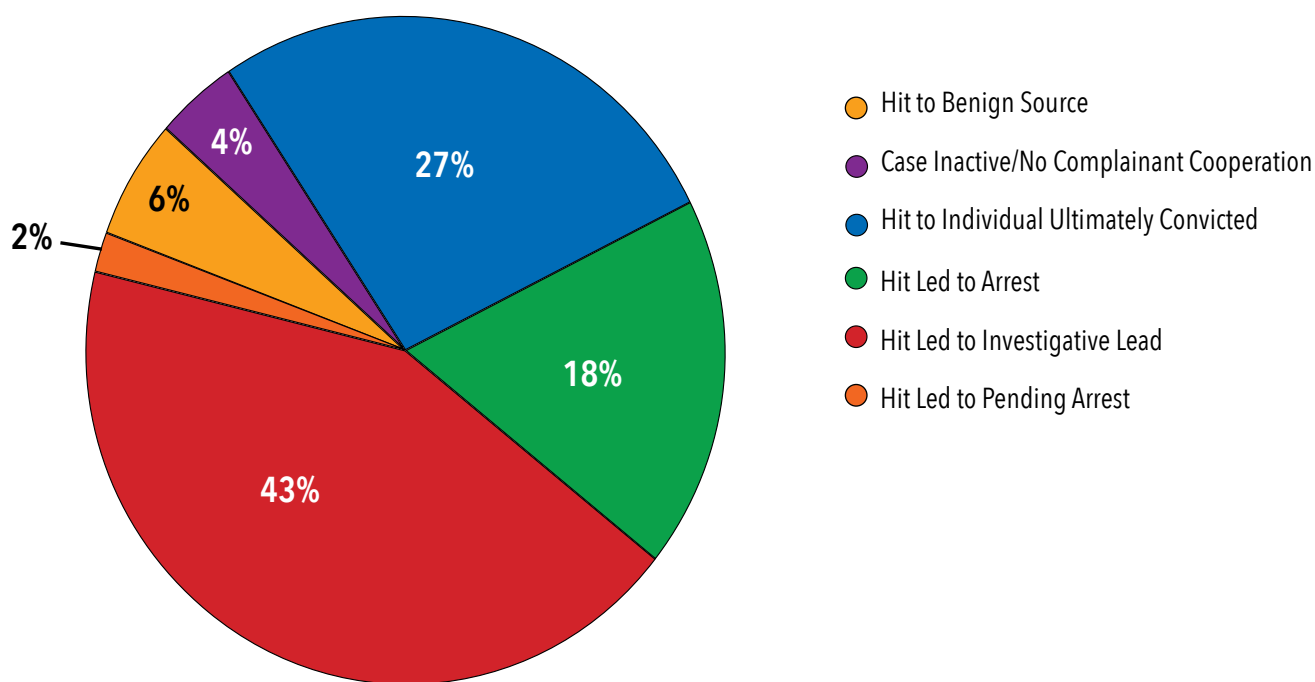
FY 17 FORENSIC REQUEST SUBMISSIONS



After our forensic scientists' work has been reported out to the appropriate requesting agency, the women and men of FIU continue to track the impact our scientists' work has on cases and investigations going forward.

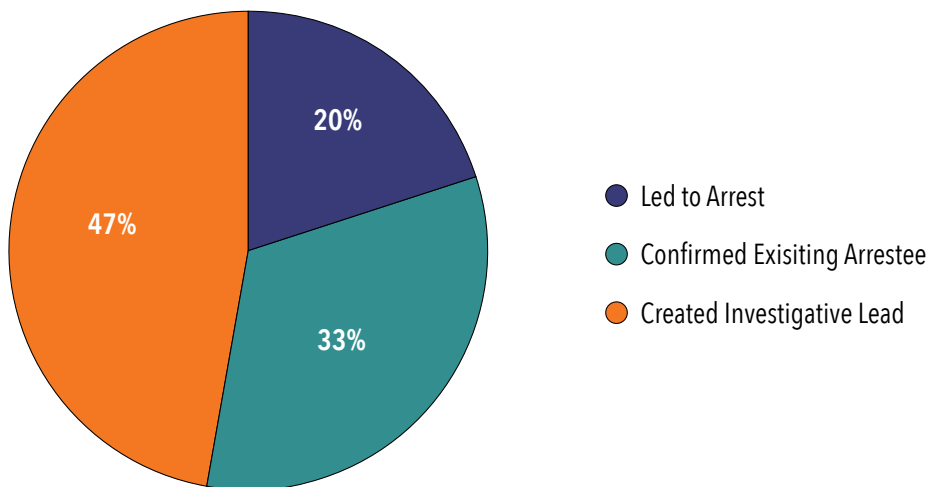
As illustrated below, when the Forensic Biology Unit's DNA scientists match an evidentiary DNA sample to an existing profile in the FBI's CODIS database, strong leads, arrests, and convictions are the likely result.

POST-REPORTING IMPACT OF DNA HITS IN CODIS



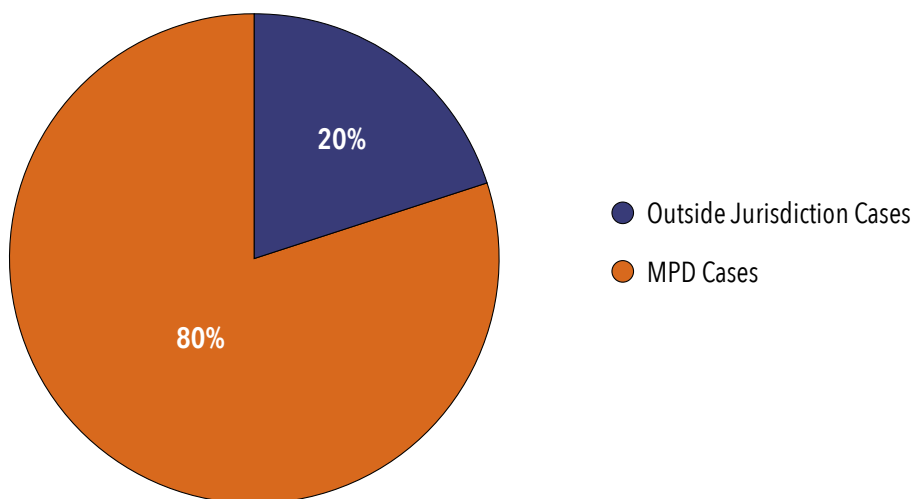
In FY17, 44 percent of the Latent Fingerprint Unit's matches to existing fingerprint samples in the AFIS database directly assisted in an investigation. The impact of these hits in MPD cases ultimately closed in FY17 appear below.

IMPACT OF AFIS HITS ON MPD CASE CLOSURES



The Firearms Examination Unit uses the NIBIN database to link multiple investigations, and even offenders, through the re-use of firearms in multiple crimes. These links can serve as the basis for important investigative leads in some of the most important crimes occurring in and around the District. Below, the proportion of those cases linked to local investigations in FY17 is compared to those hits linking a MPD investigation to ongoing investigations in outside jurisdictions.

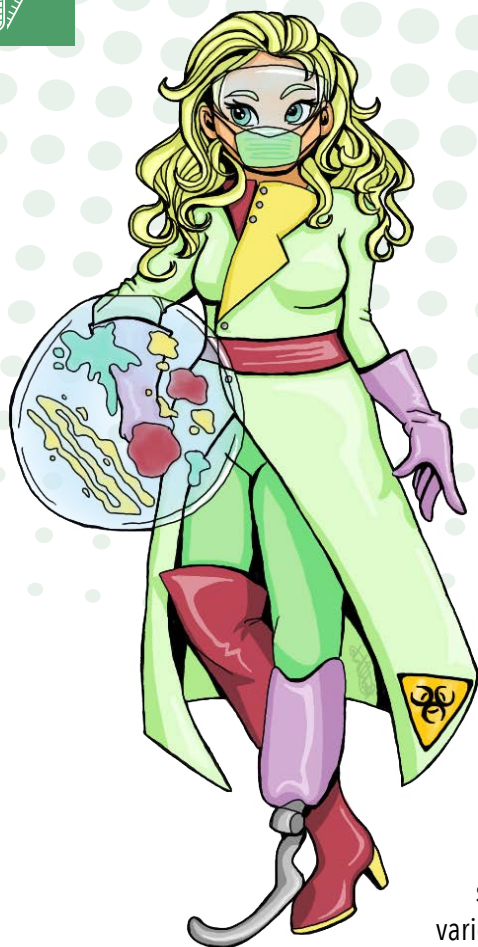
LEADS FROM NIBIN-LINKED INVESTIGATIONS



ACCOMPLISHMENTS

FIU has been a meaningful contributor to the District's Summer Crime Initiative (SCI) through:

- ▶ Daily tracking of offenses as well as incidents of "sounds of gunshots"
- ▶ Monitoring evidence submissions and forensic examination requests related to SCI offenses/incidents
- ▶ Prioritizing forensic examinations requests
- ▶ Organizing and analyzing information into reports



PUBLIC HEALTH LABORATORY

Welcome to the Public Health Laboratory (PHL), where we test samples of a wide variety of materials for bacterial and viral infections,

heavy metals, toxic or volatile materials, and other hazards to public health and safety. The PHL provides clinical diagnostic testing, disease surveillance, emergency response support, applied research, laboratory training, and other essential services. Additionally, PHL is home to our newly formed Forensic Chemistry Unit (FCU). FCU, initially formed in late 2016, was the vision of Mayor Bowser who recognized the need for better forensic chemistry capabilities. Our superhero chemists hit the ground running and have received national recognition for the discovery of a new drug in the US drug supply. They identified this drug while analyzing a syringe from a death scene that had been submitted by the DC Office of the Chief Medical Examiner (OCME). The initial results indicated that the drug was a new form of fentanyl. Further analysis indicated that the substance was methoxyacetyl fentanyl, a form of fentanyl previously not detected by any other forensic chemistry laboratory. Also this year, FCU developed and implemented additional procedures in preparation for ISO17025 accreditation of laboratory procedures and management practices involved in illegal drug identification. The unit is on track to successfully obtain accreditation in 2018.

The PHL superheroes have continuous activities and heavy workloads to manage. That is why it is important to have strong managers in place that can set the vision and tone to sustain what is working, fix what is broken, and enhance operations and programming. This year we brought on Dr. Pushker Raj, to join our PHL management team as chief of the Virology/Immunology Unit. Dr. Raj has headed up the effort to address needed testing refinements following an in-depth review of the PHL application of the CDC issued Zika testing procedures. Additionally, as a nationally recognized leader, he has improved our rabies testing capabilities to ensure efficient identification of this deadly disease.

Public health laboratories are the only entities allowed to test for rabies virus from potentially infected animals. The PHL tested 191 animals for rabies in 2017. This testing revealed that 43 percent of raccoons submitted to the laboratory for testing were positive for the virus. This testing helps the Department of Health (DC Health) survey for rabies within the District.

KEY PERFORMANCE INDICATORS

All Emergency Response Outbreak samples were analyzed within six days after confirmation of receipt. These samples include blood, urine, stool, and referred bacterial cultures. PHL also tests environmental samples submitted by the Federal Bureau of Investigation (FBI). These samples are top priority since they could indicate an attack using a biological or chemical warfare agent has occurred in our nation's capital. In fiscal year 2017 (FY17) the PHL analyzed 100 percent of these samples within 24 hours.

WORKLOAD MEASURES

PHL has conducted 3,505 tests for the samples that have been received by our molecular biology superheroes. They have tested for foodborne illnesses, viruses transmitted by mosquitos, and seasonal influenza. Our superheroes have also performed 79 proficiency tests in which PHL tested unknown samples sent to the laboratory by the Center for Disease Control and Prevention (CDC) and other US Department of Health and Human Services approved proficiency test programs. There were a total of 31 validation studies performed to verify that particular instruments, software programs, and measurement techniques met appropriate standards and were ready to be implemented.

ACCOMPLISHMENTS

- FY17, PHL passed certification audits conducted by the Centers for Medicare and Medicaid Services (CMS), under the Clinical Laboratory Improvement Amendments (CLIA), and the CDC Division of Select Agents and Toxins (DSAT).
- PulseNet is a national laboratory network that connects foodborne illness cases to detect outbreaks. In FY17, PHL enhanced PulseNet laboratory functions, including verification and validation of the Next Generation Sequencing platform.
- To maximize DFS's ability to respond to potential outbreaks and other emergencies, PHL cross-trained technical staff to respond to unexpected testing demand.
- PHL's microbiologists improved their diagnostic capabilities by enhancing their ability to detect and characterize specific bacteria.
- PHL improved the District's ability to respond in the event of terror attacks, expanding biomonitoring testing capability to include nerve agent exposure screening in serum.
- PHL collaborated with the DC Department of Corrections (DOC) to design safety training materials to guide DOC staff in the safe handling of synthetic drugs, and to improve screening for and detection of illegal substances at DOC facilities.
- PHL maintained its position as a trusted voice in the public health community, participating in research efforts, conducting studies, and publishing multiple manuscripts.

The PHL helped to solve a potentially deadly rabies case this year. A federal employee was severely bitten by a raccoon in broad daylight. The animal was caught and sent to the laboratory for testing. The PHL promptly tested the sample and provided results the same day. The raccoon was positive for the virus.



RESEARCH STUDIES

- ✓ Comparison of Four Zika Virus Molecular Detection Assays
- ✓ Comparison of Two Molecular Carbapenemase Detection Assays
- ✓ Verification of Bruker Biotyper MALDI-TOF MS for Diagnostic Use

PUBLICATIONS

- ✓ Monoclonal Antibodies Show Promise as the Key to Zika Virus Diagnostics
- ✓ The Role of Serologic Testing for Zika Virus Infection



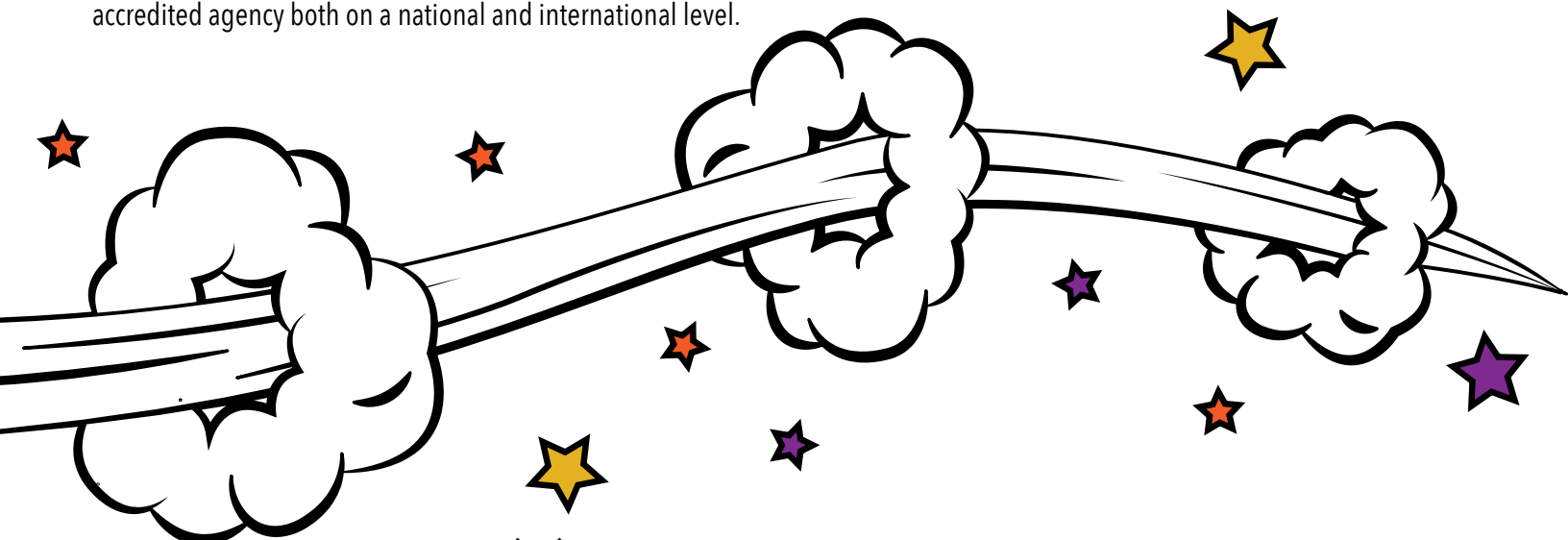
TRAINING & QUALITY

Exceptional training is the foundation of DFS. All employees in each DFS division - from DNA scientists to Human Resources staff - qualify at the highest standards in their respective fields, ensuring they deliver only the finest quality of work to the people of DC. When new technology and better methodologies emerge, DFS updates its training to reflect the changes, and implements the newest best practices. The Training and Quality division keeps our agency current and performing as effectively and efficiently as possible. For that reason, this division's main initiative in FY 17 was to attend more external conferences and professional meetings to learn the latest advancements in the forensic science disciplines. By doing this, DFS has established itself as a more prominent and accredited agency both on a national and international level.

KEY PERFORMANCE INDICATORS

Our superhero-scientists exceeded the national goal for meeting technical competency requirements. While the national target aimed for agencies to complete 90-percent of the requirements, our DFS scientists completed 99-percent of them during the first and second quarters of FY 17, and 100-percent for the last two quarters of the year.

In total, our superhero-scientists completed 2,220 hours of training in FY 17, ensuring they enter FY18 fully conversant with the most cutting-edge, effective techniques.



INITIATIVES

CRIME SCENE SCIENCES TRAINING

The CSS learned the latest in Bloodstain Pattern Analysis, TASER Evidence Collection, Firearms Safety, Basic Report Writing, Courtroom Testimony and many other related topics.

CSS Training

- Buried Bodies and Surface Skeletons
- Bloodstain Pattern Analysis
- Trajectory Documentation
- Basic Photography
- Basic Report Writing
- Vehicle Processing
- TASER Evidence Collection
- Firearms Safety
- Post Blast Investigator Training
- LEICA 3D LASER Scanning
- IAI Crime Scene Certification Test Preparation
- Courtroom Testimony/ Mock Trials

FORENSIC SCIENCE LABORATORY TRAINING

FSL staff received advanced training in subjects such as Palm Print Comparison Techniques, Ammunition and Armorer's Courses, Implementation of 3D Technology, Analysis and Statistics, as well as the Annual Review of DNA Data Accepted at NDIS.

FSL Training

- Annual Review of DNA Data Accepted at NDIS
- DNA Recovery and Sources of Contamination
- Advanced Digital Forensics and Seizure of Mobile Device
- Palm Print Comparison Techniques
- Ammunition and Armorer's Courses
- PCast Response Training
- Courtroom Testimony Made Easy with Stakeholders

PUBLIC HEALTH LABORATORY

Some workshops attended by PHL scientists in FY 17 included Laboratory Methods for Detecting Rabies, Immunological Case Studies in Infectious Disease, Genomics and Bioinformatics in Clinical Microbiology and Agents of Bioterrorism.

PHL Training

- Respiratory Pathogen Detection
- HIPAA
- Zika MAC-ELISA serologic assay
- Agents of Bioterrorism
- Emerging and Resurging Infectious Diseases
- Genomics and Bioinformatics in Clinical Microbiology
- Laboratory Methods for Detecting Rabies
- APHL/CDC Zika and Yellow Fever Uganda Workshop
- Emerging Leader Cohort 9 Training Program



Getting to know the people of DC is a priority at DFS, so outreach is something we think about year-round. Last year, we hosted or took part in countless neighborhood events. Many of our staffers from various divisions coordinated with DC Public Schools and visited area schools to do science demonstrations for younger students. At the mayor's "Night Out Against Crime" event, we demonstrated for kids how we dust for fingerprints on our Crime Scene Sciences van, and got acquainted with their parents in the process. We also attended numerous national conferences and connected with our counterparts from around the country, who are as dedicated to their communities as we are.

Finally, tours at DFS are one of our favorite forms of outreach. We always make it a point at every event we attend to invite people to visit us at our building. Our team loves giving people a chance to see what we do in our labs.

Here are some of the outreach efforts we enjoyed in FY 17:

OPERATIONS/DCHR

DFS' Human Resources group held or took part in several events to engage with residents who wanted to become part of the DFS team - either as interns, employees or volunteers. Some of the events we attended include:

- Office of Contracting and Procurement DC BUYS: Reverse Trade Fair
- D.C. Department of Human Resources Veteran Job Fair
- Marion Barry Summer Youth Employment Program (MBSYEP) Job Fair UDC Fair

FIREARMS EXAMINATION UNIT (FEU)

- Our superheroes in FEU hosted members from the National Institute of Standards and Technology (NIST), Cadre Research, and three different local firearms labs for their "Lunch and Learn" series on Advances in Firearms Virtual Microscopy.
- Examiners generated test fires from the reference firearms collection to help populate the NIST Ballistics Toolmark Research Database. The data will be used as part of ongoing research to further validate and support the science of firearms and toolmark identification through objective quantitative metrics and statistics.

FORENSIC BIOLOGY UNIT (FBU)

- In June and July 2017, DFS employees participated in a Forensic Science Camp that was comprised of both local children and some visiting DC. During the camp, DFS employees introduced the campers to different aspects of the forensic field, such as DNA analysis, fracture matching, lifting fingerprints and observing biological fluids with luminol.
- In June 2017, the DFS State CODIS Administrator for the District of Columbia hosted a CODIS 101 presentation and discussion with the Network for Victim Recovery of DC (NVRDC) Executive Leadership Team. The attendees learned about the FBI's Combined DNA Index System, DFS' CODIS Program, and the foundation for evaluating a case and DNA profiles to determine CODIS eligibility.

LATENT FINGERPRINT UNIT (LFU)

- LFU employees attended several events in FY 17 to give high schoolers and college students insight into career opportunities within the forensic science field. Our crew talked to big crowds at the College Board Upward Bound Program event, as well as a conference hosted by the Georgetown Summer Forensic Science Institute.

CRIME SCENE SCIENCES DIVISION (CSSD)

- CSSD conducted the annual Public Safety Academy at Anacostia High School. This one-day academy had 10 participants this year who we trained on the process of crime scene collection, documentation, processing and reporting.
- Our CSSD staffers also made numerous trips to DC elementary and middle schools to introduce younger kids to science. Some of these events where we worked with DCPS and other partners included:
 - ▶ DC Police Foundation (Crime Scene/Tour Demo)
 - ▶ DCPS Summer School
 - ▶ LaSalle-Backus School Career Day
 - ▶ Washington Math and Science Tech High School STEM Field Day
 - ▶ Raymond Education Campus Career Day
 - ▶ National Law Enforcement Museum

PUBLIC HEALTH LABORATORY (PHL)

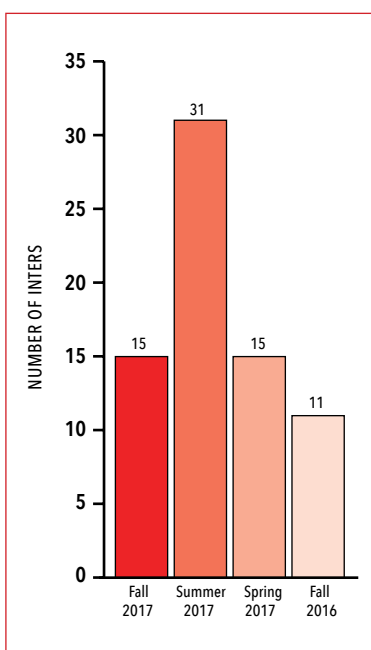
- Our PHL superheroes were invited to serve as lecturers at a number of national engagements such as:
 - ▶ Chemical Terrorism and Forensic Chemistry LRN-C Biannual Technical Meeting, October 2016, in Austin, Texas
 - ▶ DC PHL Collaboration with Office of the Chief Medical Examiner for Analysis of Syringes LRN-C Biannual Technical Meeting, April 2017, in Richmond, Virginia
 - ▶ Keynote speaker for the University of Maryland School of Medicine Department of Medical and Research Technology Commencement, May 2017, in Baltimore, Maryland
 - ▶ Association of Public Health Laboratories Annual Meeting, June 2017, in Providence, Rhode Island
 - ▶ Keynote speaker for the George Washington University Milken Institute School of Public Health One Health Day, November 2017, in Washington, DC



INTERNS HIGHLIGHTS

At DFS, interns are a big deal. We recognize the significant contributions they bring to our labs. These amazing men and women joined us from high schools, colleges, and universities across the country. They're proof that anyone at any educational level and age can enjoy science. These superhero interns were eager to learn not only the operations and programs of the agency, but also to dive deep into the technical subject matter.

All interns had to meet detailed criteria for the Programmatic Internship (junior or senior undergraduate students), Research Internship (masters or doctoral level students), or the S.T.E.M. Program High School Internship (junior or senior high school students). Once they checked the corresponding boxes, we reviewed their applications, conducted interviews, completed background checks, and



welcomed them to DFS. From the fall of 2016 through fall of 2017, we were fortunate to bring in 72 of the brightest interns from across the nation.

THE WORK DFS INTERNS DO

Internships are very much what people make them at DFS. One intern in our Digital Evidence Unit researched cyberterrorism, and devised a plan on how to avert a possible cyberattack. Another looked into "human microchipping", and created a list of its possible advantages and disadvantages.

Some interns in our Crime Scene Sciences Unit went on ride-alongs to crime scenes, where they observed the recovery of evidence which was eventually brought to DFS for testing. Others went with our employees to DC elementary and middle school classrooms to help teach students about the work DFS does. Fingerprinting first graders on "I.D. for Me" pamphlets was a huge hit with 5 and 6-year-old DC students. The pamphlets were given to the kids' parents at the end of the day.

Intern Aliza Bolling, who was a student in the Biotech program at McKinley Technology High School, focused on detection methods used for the Zika virus in our Public Health Lab. Four other interns from McKinley Tech - Janae Collins, Jordan Harmon, Erikah Scarboro and Damoni Tolson- studied microbial identification systems also used by our Public Health scientists.

Aside from working within our divisions, interns took part in 10 training sessions which helped them not only to be proficient at their respective jobs, but also started them on the road to plotting their own professional career-maps.

Intern Training Courses included:

- ▶ Onboarding
- ▶ Resume writing
- ▶ Mock interviews
- ▶ 911 Call Center Tour
- ▶ Ride-Along with MPD
- ▶ Multigenerational Training
- ▶ Unit Demonstrations with Q&A
- ▶ Meet and Greet with the Director
- ▶ Viewing of Autopsy and OCME tour
- ▶ CSS interns - Mass fatalities training

DFS ASKED 2017 INTERNS: "HOW'D WE DO?"

"It was such a wonderful experience. I got much more out of [it] than I ever would have hoped for. I felt a part of the DFS community. I was able to connect with members of other departments and units within DFS and the building. I would 110 percent recommend this internship to others interested in the forensics and/or public health fields."

Sophie Hryzan | Summer 2017

"This summer allowed me to meet amazing people and get experience in forensic science. I learned so many things while interning at DFS, including how to write an impressive resume and the next steps for becoming a forensic scientist."

Adrienne Moore | Summer 2017

"My summer 2017 internship was one of the best experiences of my life! The experiences and work I did with DFS helped me realize the career path that I wanted to pursue. I have taken what I have learned from this internship and applied it in the schoolwork I am doing now, which definitely distinguishes me from my classmates. I highly recommend this internship experience to anyone who is interested, they will not regret it!"

Timothy Lipari | Summer 2017

What semester did you intern with DFS?

"I was a high school senior completing an internship for a senior project. I was with the DFS from February 2017 through March 2017."

What did you learn from the internship?

"I learned what public health is as well as the role of the public health laboratory as it pertains to public health and safety. I obtained extensive knowledge of viruses and instrumentation used to identify microorganisms."

Did the internship meet or exceed your expectations?

"The experience exceeded my expectations. Although I was not allowed to handle actual biological specimen, I obtained knowledge and experience that many will never experience as a high school or college student. I now know the importance of laboratory science and how it fits into public health."

JORDAN HARMON | WINTER 2016

What were your main roles/responsibilities?

"On a day to day basis, I was helping Shih-Ching (Sunny) with logistics and supplies. Often, I had the privilege to ride-along visiting crime scenes, understanding the work that must be conducted when out in the field."

What did you learn from the internship?

"I learned many valuable things in the CSS Division such as photography, latent prints, Leica Scan, BlueStar, and how to approach and somewhat process a crime scene, along with several other items obtained."

How was your overall experience with DFS?

"The experience was great, I would gladly do it again!"

AMIR COLEMAN-MITCHELL | SUMMER 2017

What were your main roles/responsibilities?

"I was responsible for the inventory of electronic and paper records within the agency by completing survey forms for the Office of Public Records and District of Columbia Archives."

What surprised you about the internship?

"When I first came to the Department of Forensic Sciences, I was not expecting to gain the connections that I did. I was not expecting to have the desire to arrive early and leave late. I was not expecting to miss the place and people when my internship ended."

How was your overall experience with DFS?

"As I write this now in reflection, I think of how much I want to return. I think of the people that influenced my life and mentored me along the way. I think of how blessed I was to have had a supervisor who taught, mentored, and encouraged me during this past summer."

KRISTEN ROEMMICH | SUMMER 2017



DFS: FY2018 AND BEYOND!

After these great achievements in science, discovery of a new drug, nearly flawless audits, establishment of new laboratories, and engaging with our future superhero scientists, we are planning even greater strides ahead. Below is a snapshot of a few initiatives on the horizon for Fiscal Year 2018:

PUBLIC HEALTH LABORATORY (PHL)

- Research, assess, and conduct accreditation process for FCU.
- Complete the implementation of Next Generation Sequencing to include second part of PulseNet, carbapenem resistant enterobacteriaceae, and influenza testing practices.
- Implement Environmental Water Chemistry to study sources, reactions, transport, effects, and fates of chemical species in the air, soil, and water environments; and the effect of human activity and biological activity on these chemical species.
- Re-establish sexually transmitted disease testing for the DC Department of Health, which will include testing for chlamydia, gonorrhea, and syphilis serology.
- Examine possibility of gonorrhea culture for surveillance of antimicrobial resistance-evaluation, which will involve the collection and analysis of data for the detection and monitoring of threats to public health.

FORENSIC SCIENCE LABORATORY

• **Forensic Intelligence Unit**

- ▶ Complete analysis of impact of 2016 and 2017 forensic intelligence hits provided by FSL Units in the criminal justice process.
- ▶ Make DFS Dashboard portable and track electronic depiction of case completion.
- ▶ Distance Learning collaboration with University of DC.

• **Latent Fingerprint Unit**

- ▶ Implement the Evidence Processing – “Chem Lab” during the second and third quarters of the fiscal year. This will include a complete review of Standard Operating Procedures (SOPs) to include modifications and implementation of new SOPs as needed.
- ▶ Complete the Mideo implementation increasing quality and transparency of the examinations and resulting work products.
- ▶ Hire a Technical Lead to assist with quality assurance within the unit, train analysts, and help with the implementation of new technologies.

- **Firearm Examination Unit**

- ▶ Implementation of the Mideo GunWorks, which will combine the Firearms and Toolmarks examination processes into one consistent, manageable, electronic workflow to gather and track forensic notes and microscopic digital photographs.
- ▶ Implementation of the Automated Ballistic Identification system, a scanning device which generates digital images in both 2D and 3D of bullets and cartridge cases for examination, comparison, and correlative searches within existing databases.

- **Digital Evidence Unit**

- ▶ Research requirements and submit the 17025 Accreditation application. This will require DEU to finish/ finalize the DEU Quality Assurance Manual (QAM) and SOPs, complete training manuals/programming, conduct pre-assessment, bridge gaps/nonconformities, and take other actions to enhance operations and programming functions.
- ▶ Implement DEU Data Portal to allow requesters to access their data sets from their desktop instead of having to pick up CDs/DVDs/USB drives and search/tag data by the detective/requester. It will provide and present data from all devices in a user-friendly format.
- ▶ Enhance data collection from cell towers and the cloud to add capabilities to meet the growing needs of stakeholders and forensically collect and analyze data.

CRIME SCENE SCIENCES

- **Crime Scene Science Unit**

- ▶ Global True View expansion, functionality, and accessibility for all stakeholders to increase transparency.
- ▶ Begin training MPD officers in the collection of shell casings for the purpose of expedited entry into NIBIN. This pilot program will be limited to the Seventh District only.

TRAINING AND QUALITY

- Establish Crime Scene Sciences Trainers program to streamline and strengthen intragovernmental collaboration with our partner agency, MPD. This effort will make coordination more efficient and explore new approaches to enhancing crime scene sciences.
- Begin identifying and assessing certifications to add to the already impressive list of credentials for the Forensic Science Laboratory.
- Introduce Forensic Science Laboratory Blind Proficiency Test "Quality Assessment Tool" for the Latent Finger Print Unit, Firearms Unit, and DNA unit.
- Assess the accreditation criteria and complete application for the Forensic Chemistry Unit and Digital Evaluation Unit to ensure they both are nationally recognized and respected research initiatives.

OPERATIONS

- **Forensic Technology**

- ▶ Collaborate with partner agencies MPD and the Office of the Chief Technology Officer to combine our Evidence Management Systems. This will allow us to better communicate, coordinate, and share best practices to strengthen evidence management.



DC DEPARTMENT OF FORENSIC SCIENCES 2017 ANNUAL REPORT



GOVERNMENT OF THE DISTRICT OF COLUMBIA DEPARTMENT OF FORENSIC SCIENCES

401 E STREET, SW WASHINGTON, DC 20024

Special thanks and recognition go to Ms. Rachel Mando for her support with creating the illustrations within this report. She is an example of the superheroes we have supporting the agency and ultimately the health and well-being of the District.

Rachel Mando joined the DFS team as an intern, and has worked her way up to her current position as Health and Safety Specialist. Her responsibilities include teaching safety trainings, coordinating the medical surveillance and vicarious trauma programs, and maintaining the staff database. A New York native, she moved to the DC area after completing her degree in Forensic Sciences.



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